Report To The 48th Montana Legislature On The Renewable Energy Grant And Loan Program

January 1983

MONTANA ENVIRONMENTAL QUALITY COUNCIL
State Capitol
Helena, Montana 59620
(406) 449-3742

ENVIRONMENTAL QUALITY COUNCIL

ALTERNATIVE ENERGY SUBCOMMITTEE

INTERIM REPORT

Prepared By

DEBORAH B. SCHMIDT, Director
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INTRODUCTION

In 1975, the Montana Legislature adopted the nation's first state-funded financial incentive program to develop emerging renewable energy technologies.* The program's stated purpose was to decrease Montana's reliance on non-renewable fossil fuels, and increase solar, wind, biomass, geothermal, and small-scale hydro renewable energy sources. Funded by a percentage of coal severance tax revenues, the program provided for the research, development, and demonstration of these energy sources.

The Legislature assigned the State's Department of Natural Resources and Conservation (DNRC) to administer the program. DNRC began issuing grants to individuals and businesses in 1976. In its first few years, the program concentrated heavily on solar technologies. But as the nation's and state's energy pictures developed, so did the competition for the renewable energy grants. Technologies for a variety of renewable energy sources matured at the same time the program was coming under closer scrutiny by the Legislature and the public. This interest was especially high because the controversial coal severance tax funded the program.

Although the program's original legislation had been amended only once since its adoption, the 1981 Legislature decided to revamp it in a three-pronged effort.

* Codified in 90-4-101 et seq., MCA

The first legislative change established a loan program to stimulate the fledgling renewable energy industry and thus give a broader range of Montanans an opportunity to choose from a variety of commercial renewable energy options. Sponsored by Senator Harold Dover (R-Lewistown), SB 141 directed the DNRC to provide loans that would be administered through the state's financial institutions.

The second legislative action lowered the percentage of the coal severance tax that was allocated to fund the program from 5 percent to 4.5 percent. However, because coal tax revenues have been increasing, this change has not actually resulted in fewer dollars going to fund the program.

The third legislative change, and in fact the second one as well, reflected a dissatisfaction among the majority of legislators with the administration of the program to that point. Many legislators believed that there had been no demonstrable reduction of the state's reliance on fossil fuels. Charges surfaced about favoritism in issuing grants, and about too much emphasis on solar technologies that benefitted only a select group of "insiders". In addition, many legislators felt a lack of grant follow-up, reporting, and financial accountability detracted from the program's effectiveness.

Within this context, Representative Joe Quilici (D-Butte), sponsored HB 398, which sought to correct these deficiencies and tighten administration of the program. The bill limited the funding

of demonstration projects to those with good potential for saving non-renewable energy, and prohibited funding those demonstration projects similar to unproductive projects in close geographic proximity to a similar project, and those projects that did not fit within the goals of the statute. In addition, the legislation required the DNRC to monitor grants and loans and report to the Legislature on the effectiveness of funded projects or programs. Representative Quilici's bill also required DNRC to submit periodic reports to the Environmental Quality Council (EQC) for review and evaluation, and directed the EQC to make recommendations to assure the greatest possible benefit from the program to the people of the State of Montana.

The purpose of this report is to outline the oversight activities of the EQC and to discuss key elements of the Renewable Alternative Energy (RAE) program and the progress made to insure its effectiveness. Conclusions and recommendations are also included. This report will not concentrate on details of the program such as specific projects funded or eligibility requirements. DNRC's publications and report to the Legislature adequately provide this information.

EQC OVERSIGHT ACTIVITIES

Following the assignment of oversight activities to EQC, Chairman Representative Dennis Iverson (R-Whitlash) delegated the oversight task to a subcommittee headed by Senator Dover and composed

of public members, Dr. Leslie Pengelly and Glen Rugg. The subcommittee was required to report regularly to the full EQC which, in turn, agreed to act on the final report and conclusions and recommendations.

As the EQC staff began to formulate a plan for its oversight activities, it became clear that other legislative entities had an interest in the program as well, including the Legislative Audit Committee and the Coal Tax Oversight Subcommittee.

During the Spring of 1981, the Legislative Auditor had released a report on selected energy grant programs, including the RAE program. The report identified several areas of concern, including program direction, monitoring of grants, contract provisions, fund balance, documentation, and contracted services. The Legislative Auditor issued seven recommendations for the DNRC:

1) Establish a clear, concise set of goals and objectives for the program and devise a system for measuring the attainment of those goals and objectives;

2) Enforce requirements for progress reports;

3) Establish and consistently apply a policy of verifying invoices against grant payment requests;

4) Establish a formal policy requiring systematic review of on-site visits;

5) Enforce the grant provision and law requiring completion within one year;

6) Revise the tangible property provisions of the grant contract; and,

7) Discontinue the use of professional service contracts for permanent positions and record contracts for administrative services under operating expenses rather than grants.

Wishing to avoid duplicating the Legislative Auditor's work, the EQC Alternative Energy Subcommittee held its first meeting in September 1981 with representatives of the Auditor's office. At that time, the subcommittee agreed to build on the Auditor's recommendations and monitor the program to see that it met its goals; that criteria for evaluating projects receiving funding were adequate; that its rules for administering the program were workable, fair, and within legislative intent; and, that the legislative direction for the program was clear and sufficient for administration of an effective program. The subcommittee decided to focus on development of the commercialization and loan elements of the program. The subcommittee suggested that the EQC could serve as a sounding board for policies for redevelopment of the program rather than to act after the fact to oversee the program.

EQC staff communicated frequently with DNRC staff over the following eighteen months to carry out the subcommittee's direction. The subcommittee again met with DNRC representatives in January 1982 to review the methodology the department used to select proposals submitted to them. The subcommittee reviewed proposed rules

implementing commercialization and loan procedures as well as generally revamping the program.

At that same time, the EQC subcommittee met with the Coal Tax Oversight Subcommittee (CTO), which oversees the spending of coal tax revenues. Again in order to avoid duplication, the two subcommittees agreed to divide oversight responsibilities. They agreed to have the EQC focus on adequacy of administration of the program, while CTO would concentrate on whether or not it was appropriate for the program to be funded by coal tax money and at what level.

EQC subcommittee members and staff also met periodically with the Renewable Energy Advisory Council (REAC) to coordinate efforts to advise on effective administration of the program.

DNRC RESPONSE TO LEGISLATIVE RECOMMENDATIONS

Acknowledging flaws in the way grants had been distributed in the past and believing that a strong commitment to development of alternatives to non-renewable energy sources represents a compelling defense of the coal severance tax, DNRC recently completed a major restructuring of the program.

DNRC made the following changes:

1) DNRC will closely monitor the projects funded to insure completion and that money is appropriately spent;

2) Emphasis is now being placed on stronger conservation measures to complement the efficiency of alternative energy projects;

3) As some forms of alternative energy reach the commercialization stage, money will be awarded in loans as well as grants in a change authorized by the Legislature. This will minimize interference with the market and the State will receive a monetary return on its investment;

4) Criteria for awarding grants and loans have been strengthened, including an emphasis on competence of the applicant, engineering and technical soundness, need for the technology, and the audience targeted by the project. The projects are given points for various objective criteria, and those with the highest scores are funded. In this way, the DNRC has eliminated much of the "politics" previously involved in the process; and

5) DNRC will advertise the program more widely.

Another important aspect of the program's reorganization is a study entitled the Sustainable Energy Assessment (SEA) that will help determine the end-use of energy generated and used in Montana. Through completion of this assessment in the next two years, the department can direct the program's resources to where they will be most effective. The study attempts to identify the most productive opportunities for conservation and renewable energy, the resources available for energy production, and the most appropriate systems for meeting energy demands with available resources.

These and other changes are accurately described in greater detail in DNRC's report to the Legislature and are attached as Appendix III. However, several modifications to the program merit

closer attention than given in the above highlights or in DNRC's report. These include development of the loan program, rules revisions, and the Sustainable Energy Assessment (SEA).

In carrying out legislative direction to institute a loan program for commercialization of renewable energy sources, DNRC worked closely with banks, credit unions, and savings and loan institutions. The results of this process potentially will familiarize lending institutions with promising renewable technologies, thus stimulating the funneling of private funds to worthy projects. DNRC and the REAC first review loan applications for technical soundness and then authorize qualified projects to be submitted to a financial institution of the applicant's choice.

Applicants showed some confusion in the first loan cycle with some assuming that these loans were not subject to the normal requirements of collateralization. However, the financial institution evaluates these applications as they would other requests for commercial loans. As part of the review process, the lending institution carries out necessary credit checks and other customary loan origination procedures to secure its and the state's share of the loan. This process came under some initial criticism from loan applicants who questioned the advantages of the program under these conditions. However, DNRC and the subcommittee believe that this process helps insure against the loss of state funds while still providing a financial stimulus to sound projects at interest rates lower than for conventional loans.

To incorporate this loan program and other changes to tighten grants, DNRC adopted revised rules in the Spring of 1982. Among the key elements of the revised rules are the following:

... the residency requirement for applicants is eliminated, but only projects conducted in-state will be funded;

... the preference given to small-scale projects is eliminated;

... the maximum single grant or loan is ten percent of the annual appropriation for the program;

... applicants must make a matching contribution to their projects;

... projects to commercialize alternative energy will be considered for loans only;

... loans will be made through financial institutions with the department providing up to ninety percent and the financial institution providing the remainder;

... the interest rate on the state share of any loan is equal to the Federal Reserve Discount Rate on the day the loan closes and must be a fixed rate;

... the financial institution that finances the non-state portion of a loan for a project sets its own interest rate, either fixed or variable; and,

... demonstration project eligibility is restricted, with greater emphasis on public and private non-profit projects.

Comment at the public hearing on the revised rules was generally favorable. Those submitting testimony included the Alternative Energy Resources Organization (AERO); Blue Sky Water Supply in Billings; Dana Gunderson of Helena; MultiTech, Inc., Butte; Representative Kathleen McBride (D-Butte); and, the Montana Credit Unions League. Comments centered around the role of the REAC, the eligibility of contractors of the energy division for grants and loans, and the eligibility of non-profit organizations for loans. The department has amended its rules to respond to these comments in all but one case: the mandatory creation of REAC. The department has stated it intends to continue relying on REAC for advice on the program, but that the Governor must approve the creation of official advisory councils.

While the adoption of the revised rules and development of the loan program promise to enhance the Renewable Energy Grant and Loan (REGAL) program, another change has the potential to further improve the effectiveness of the REGAL program in reducing reliance on non-renewable energy sources. The REGAL program to date has largely been reactive in nature. Completion and implementation of the SEA project can better direct the program's resources to achieve its goals. Included in Appendices IV and V are descriptions of the project submitted to EQC by DNRC and a recent status report. These reports highlight the potential benefits of the SEA project and indicate the progress being made on the study.

ROLE OF THE RENEWABLE ENERGY ADVISORY COUNCIL

Another essential element in effective implementation of the REGAL program is the Renewable Energy Advisory Council (REAC). Provided for in the administrative rules, REAC is composed of legislators and other citizens with an interest and expertise in renewable energy. Members of REAC are:

William Kebe, Butte (Chairman) - Attorney, Former Mining Engineer

Rep. Kathleen McBride, Butte - Legislator

Dave Simpson, Hardin - Environmental Engineer for a Major Coal Co.

Dana Fitzgerald, Power - Wheat Farmer

Karen Matson, Chester - Wheat Farmer

Dave Hudson, Helena - Professional Engineer

Chuck Cozzens of Billings, a banker and a former legislator, has resigned from the Council and a replacement has not been appointed.

The Renewable Energy Advisory Council met several times during the biennium to review DNRC staff recommendations for funding grant and loan projects and occasionally to advise the department on policy issues. Although the DNRC director held final authority for approval of projects, he generally accepted any modifications made by REAC to staff recommendations.

An informal survey of selected REAC members revealed that they were, on the whole, well satisfied with the program's redirection. Several emphasized increased accountability achieved under the program through tighter contracts, the use of reporting milestones, inspections, and other tools. REAC members we talked to expressed confidence in the technical competence of the staff administering the

program. Those contacted believed their counsel was heeded by the department. Both the department and the advisory council members concur in the usefulness of REAC in insuring a good program.

EQC CONCLUSIONS AND RECOMMENDATIONS

The EQC generally supports the efforts of DNRC to restructure the REGAL program. Communications between the department and the EQC occurred frequently and openly. The Council believes that legislative direction provided in the 1981 session and by the EQC has been heeded and that significant improvements in program administration have been implemented.

Several areas in which the program could be improved even further are:

1) The department should consider improving public involvement in both the review of projects for funding and the development of policy for the program. Although exclusion of extraneous political influence on funding projects is desirable, some community input to the review process could be beneficial. Determining public benefit of projects could be enhanced through better public notice of the review process.

2) The department should consider consulting more frequently with REAC and EQC on policy issues. Until the November 3, 1982 meeting, REAC largely only responded to department staff project recommendations. REAC members possess expertise and a perspective that can further enhance administration of the program. For example,

the loan program will be more responsive to applicant's needs by the establishment of three loan cycles per year, as recommended by REAC.

3) The department should submit to EQC its preliminary environmental reviews under the Montana Environmental Policy Act (MEPA). While all the REGAL projects are potentially beneficial to certain aspects of environmental quality, some may have significant negative environmental impacts as well. The EQC is interested in evaluating the overall environmental effect of these projects.

A P P E N D I C E S

I. Copy of Statute

II. Follow-Up on RAE Audit Recommendations

III. Department of Natural Resources and Conservation Report
Pages 6 - 11

IV. Montana Sustainable Energy Assessment (SEA) Descriptive Report

V. Montana Sustainable Energy Assessment (SEA) Project Status Report

Part 1

Renewable Energy Sources Research and Development

90-4-101. Purpose. The purposes of this part are to stimulate research, development, demonstration, and commercialization of energy sources which are harmonious with ecological stability by virtue of being renewable, thereby to lessen that reliance on nonrenewable energy sources which conflicts with the goal of long-range ecological stability and to provide for the funding and administration of such research. Furthermore it is the purpose of this part to allow the department to make loans through financial institutions in Montana for commercialization of alternative renewable energy.

History: En. 84-7407 by Sec. 1, Ch. 501, L. 1975; R.C.M. 1947, 84-7407; amd. Sec. 1, Ch. 624, L. 1979; amd. Sec. 1, Ch. 356, L. 1981.

Compiler's Comments

1981 Amendment: Inserted "and commercialization" before "of energy sources" in the first sentence; added the last sentence.

Commitment of Funds for Demonstration Purposes: Section 1, HB 801 (1981), provided in part: "The department may commit funds for demonstration purposes only when in its judgment such expenditures or commitments have good potential for producing savings of nonrenewable energy sources. The department may not commit funds for demonstration purposes when any of the following conditions are present:

(a) previous commitments of similar nature were not productive;

(b) a similar demonstration has been conducted within close geographic proximity of the location of the proposed demonstration project;

(c) the proposed demonstration project would not further the purpose of 90-4-101."

Effective Date: Section 5, Ch. 356, L. 1981, provided: "This act is effective on passage and approval." Approved April 14, 1981.

90-4-102. Definitions. As used in this part, the following definitions apply:

(1) "Alternative renewable energy source" means a form of energy or matter, such as solar energy, wind energy, or methane from solid waste, capable of being converted into forms of energy useful to mankind, and the technology necessary to make this conversion, when the source is not exhaustible in terms of this planet and when the source or the technology are not in general commercial use.

(2) "Person" means a natural person, corporation, partnership, or other business entity, association, trust, foundation, any educational or scientific institution, or any governmental unit.

(3) "Department" means the Montana department of natural resources and conservation.

History: En. 84-7408 by Sec. 2, Ch. 501, L. 1975; R.C.M. 1947, 84-7408.

90-4-103. Alternative energy research development and demonstration account established. There is within the earmarked revenue fund an alternative energy research development and demonstration account.

Moneys are paid into this account under 15-35-108. The state treasurer shall draw warrants payable from this account upon order of the department.

History: En. 84-7409 by Sec. 3, Ch. 501, L. 1975; R.C.M. 1947, 84-7409.

90-4-104. General powers of department. The department may:

(1) employ a staff adequate to administer this part;

(2) retain professional consultants and advisors;

(3) adopt rules governing applications and granting of funds;

(4) adopt rules governing applications for and administration and awarding of loans;

(5) consider applications and award grants or loans, subject to the availability of funds and to the appropriation of such funds by the legislature from the alternative energy research development and demonstration funds for projects that will further the purposes of this part;

(6) appoint an alternative energy advisory committee composed of representatives of state agencies and citizen members with expertise in alternative energy matters. The appointment of any such advisory committee shall be in keeping with 2-15-122.

History: En. 84-7410 by Sec. 5, Ch. 501, L. 1975; R.C.M. 1947, 84-7410; amd. Sec. 2, Ch. 356, L. 1981.

Compiler's Comments

1981 Amendment: Inserted subsection (4); deleted "for grants" after "applications" in (5); inserted "or loans" after "award grants" in (5).

Statement of Intent: The statement of intent attached to SB 141 (Ch, 356, L. 1981) provided: "It is the intent of this bill to allow the Department of Natural Resources and Conservation to make loans through financial institutions in Montana for commercialization of alternative renewable energy. The grant of rulemaking authority includes the power to establish criteria to be used in determining when a grant or a loan should be granted under the limitations of the act."

Effective Date: Section 5, Ch. 356, L. 1981, provided: "This act is effective on passage and approval." Approved April 14, 1981.

90-4-105. Applications for grants or loans. Any person may apply for a grant or loan to enable him to research, develop, demonstrate, or commercialize alternative renewable energy sources. The department shall prescribe the form for applications. Applicants shall describe the nature of their proposed investigations, including practical applications of the possible results and time requirements.

History: En. 84-7411 by Sec. 6, Ch. 501, L. 1975; R.C.M. 1947, 84-7411; amd. Sec. 3, Ch. 356, L. 1981.

Compiler's Comments

1981 Amendment: Inserted "or loan" after "grant" in the first sentence; inserted "or commercialize" after "demonstrate" in the first sentence.

Effective Date: Section 5, Ch. 356, L. 1981, provided: "This act is effective on passage and approval." Approved April 14, 1981.

90-4-106. Criteria for grant or loan awards. The department may award grants or loans to applicants under 90-4-105 in accordance with the following criteria:

(1) A grant may cover a period not exceeding 1 year, and the department may not commit itself to spending funds anticipated to be available more than 1 year after the grant period begins. The department may give an applicant a statement of intent to renew its support of his work, subject to the availability of funds and such other conditions as the department may express.

(2) The department may give preference to projects which are also supported by funding from the federal government or other persons provided the projects are consistent with the other objectives of the department. The purpose of this preference is to use the alternative energy research development and demonstration account for matching moneys in order to support more substantial research or commercialization.

(3) The department may give preference to research centers unattached to existing educational institutions where several investigators can share supporting services. However, this shall not be interpreted to prohibit the department from awarding grants or loans to existing educational institutions.

(4) The department may give preference to research centers which make information available to individuals, small businesses, and small communities seeking the use of renewable energy sources in their homes, plants, places of business, and small communities.

(5) All information resulting from such research shall be made available to the public and shall not become the private property of or under the exclusive control of any one company or person.

(6) The department may expend or commit available alternative energy research, development, and demonstration funds. The department may commit funds for demonstration purposes only when in its judgment such expenditures or commitments have good potential for producing savings of nonrenewable energy sources. The department may not commit funds for demonstration purposes when any of the following conditions are present:

(a) previous commitments of a similar nature were not productive;

(b) a similar demonstration has been conducted within close geographic proximity of the geographic location of the proposed demonstration project;

(c) the proposed demonstration project would not further the purpose of this part.

History: En. 84-7412 by Sec. 7, Ch. 501, L. 1975; R.C.M. 1947, 84-7412; amd. Sec. 4, Ch. 356, L. 1981; amd. Sec. 1, Ch. 402, L. 1981.

Compiler's Comments

1981 Amendments: Chapter 356 inserted "or loans" after "grants" in the first sentence and in (3); substituted "funding" for "grants" in the first sentence of (2); substituted "projects" for "grants" in the first sentence of (2); added "or commercialization" at the end of (2).

Chapter 402 changed "is under no requirement to" to "may" near the beginning of (6); inserted "The department may commit funds for demonstration purposes only" at the beginning of second sentence of (6); deleted "would be unproductive" after "commitments" and added remainder of subsection (6) relating to criteria for and for not committing funds.

Coordination Instruction: Section 4, Ch. 402, L. 1981, provided: "If Senate Bill 141 [Ch. 356] is passed and approved, section 4 [90-4-106] of Senate Bill 141 pertaining to the awarding of loans under 90-4-106 shall be subject to the provisions of House Bill 398 [Ch. 402]".

Effective Date: Section 5, Ch. 356, L. 1981, provided: "This act is effective on passage and approval." Approved April 14, 1981.

90-4-107. Biennial report. The department shall monitor the grants awarded and shall report its expenditures and other information concerning the implementation and effectiveness of specific projects or programs for which grants were awarded under this part to the legislature at the beginning of each regular legislative session.

History: En. 84-7413 by Sec. 8, Ch. 501, L 1975; R.C.M. 1935, 84-7413; amd. Sec. 2, Ch. 402, L. 1981.

Compiler's Comments

1981 Amendment: Inserted "shall monitor the grants awarded and" after "department"; and changed "other activities" to "other information concerning the implementation and effectiveness of specific projects or programs for which grants were awarded".

90-4-108. Oversight function of environmental quality council. The department shall submit periodic reports to the environmental quality council established in 5-16-101 for review and evaluation. The environmental quality council shall make such recommendations as it considers necessary to assure the greatest possible benefit of the program to the people of the state as a whole. Such recommendations may include proposals for legislation.

History: En. Sec. 3, Ch. 402, L. 1981.

Part 2

Home Weatherization Programs

Part Compiler's Comments

Transfer of Function: Section 9, Ch. 274, L. 1981, provided: "(1) The functions of the department of community affairs of allocating weatherization money under 90-4-201 and 90-4-202 are transferred to the department of social and rehabilitation services.

(2) Unless inconsistent with this act, any reference to the "department of community affairs" in the sections in subsection (1) is changed to the "department of social and rehabilitation services"."

90-4-201. Weatherization money consolidated. All federal funds and grants available and becoming eligible to Montana under the provisions of the community services administration's emergency energy conservation program, the federal energy administration's low-income weatherization assistance program, and any other federal funds intended to increase the energy efficiency of dwellings occupied by persons of low and fixed incomes, except for Title XX of the Social Security Act, are to be coordinated and are appropriated to the department of social and rehabilitation services.

History: En. 35-601 by Sec. 2, Ch. 583, L. 1977; R.C.M. 1947, 35-601; amd. Sec. 9, Ch. 274, L. 1981.

90-4-202. Allocation formula. (1) The department of social and rehabilitation services may use not more than 5% of the total weatherization funds for administration of the weatherization program.

(2) Each of the governor's substate planning districts shall receive that fraction of the remaining money as the number of eligible households in the district bears to the total number of eligible households in the state.

(3) The department of social and rehabilitation services may transfer weatherization money among the governor's substate planning districts if it finds that the money is not being expended in accordance with the terms of the agreements executed to carry out the provisions and purposes of this section and federal laws and regulations.

(4) Each of the governor's substate planning districts shall submit plans and proposed agreements to the units of local government in the district for review and comment before the agreements are approved by the department of social and rehabilitation services.

History: En. 35-602 by Sec. 3, Ch. 583, L. 1977; R.C.M. 1947, 35-602; amd. Sec. 1, Ch. 521, L. 1979; amd. Sec. 9, Ch. 274, L. 1981.

90-4-203. Annual allocation. State and federal weatherization funds shall be allocated to local weatherization programs on an annual basis.

History: En. 35-603 by Sec. 4, Ch. 583, L. 1977; R.C.M. 1947, 35-603.

M E M O R A N D U M

TO: Scott Seacat, Performance Audit Manager

FROM: Dick Varner, Performance Auditor

DATE: November 12, 1981

RE: Follow-up on RAE Audit Recommendations

In late 1980 and early 1981, we conducted performance reviews of seven energy related grant programs. One of those programs was the Renewable Alternative Energy Grant Program (RAE) which is administered by the Energy Division of the Department of Natural Resources and Conservation. Recently, we received a request from the Environmental Quality Council to review the Energy Division's progress in implementing our RAE related recommendations. At the same time, the Energy Division's administrator also requested that we examine their progress.

We met with the Energy Division administrator and RAE program manager to discuss their progress. In addition, we reviewed sample files and documents. The following is a brief description of our findings concerning the implementation of our RAE related recommendations.

RECOMMENDATION: WE RECOMMEND THE DEPARTMENT OF NATURAL RESOURCES:

A. ESTABLISH A CLEAR CONCISE SET OF GOALS AND OBJECTIVES FOR THE PROGRAM.

B. DEVISE A SYSTEM FOR MEASURING THE ATTAINMENT OF THOSE GOALS AND OBJECTIVES.

While the department has not formulated the goals and objectives recommended, they are taking steps in that direction. DNRC's special staff is conducting an assessment of the program's direction. In addition, they are formulating a proposal for a Sustainable Energy Assessment. This assessment should show where the RAE program needs to expend its resources. These two studies should give the department the data necessary to formulate the goals and objectives and to decide how to measure attainment.

RECOMMENDATION: WE RECOMMEND THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION ENFORCE REQUIREMENTS FOR PROGRESS REPORTS.

The department has implemented a system whereby grantees are sent reminders when progress reports are due. Follow-up letters are sent if progress reports are overdue. In addition, all requests for reimbursement are rejected if progress reports are overdue.

RECOMMENDATION: WE RECOMMEND THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION ESTABLISH AND CONSISTENTLY APPLY A POLICY OF VERIFYING INVOICES AGAINST GRANT PAYMENT REQUESTS.

The department is requiring proof of receipt and payment for all goods and services prior to reimbursement. In addition, they have instituted a system which allows them to know the financial status of each grant.

RECOMMENDATION: WE RECOMMEND THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION ESTABLISH A FORMAL POLICY REQUIRING SYSTEMATIC REVIEW OF ON-SITE VISITS.

During July, August, and September, the program staff visited all of the grantees. They found these visits both informative to themselves and beneficial to the grantees. They were able to assist some grantees with problems. For example, the Shelby solar swimming pool had not been operating as efficiently as expected. The evaluator was able to identify that trapped air due to the lack of an air relief value was the culprit. They stated their future plans include a visit prior to issuing the grant, visits at various stages of the project, and annual follow-ups after completion.

RECOMMENDATION: WE RECOMMEND THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION ENFORCE THE GRANT PROVISION AND LAW REQUIRING COMPLETION WITHIN ONE YEAR.

Of the problem grants noted in the report, four cases have been submitted for legal action. The remaining grants are being terminated. In the future, they intend to adhere as closely as possible to a one-year term. When circumstances beyond the grantees control makes completion within one year impossible, they are requiring a written addendum to the contract specifying the length of the extension and reasons.

RECOMMENDATION: WE RECOMMEND THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION REVISE THE TANGIBLE PROPERTY PROVISIONS OF THE GRANT CONTRACT.

The department is in the process of revising the contract in total so the wording of tangible property provision was not available for review. However, our discussions with department officials indicates that they understand the concerns in the report and intend to implement the recommendation.

RECOMMENDATION: WE RECOMMEND THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION:

A. DISCONTINUE THE USE OF PROFESSIONAL SERVICE CONTRACTS FOR PERMANENT POSITIONS.
B. RECORD CONTRACTS FOR ADMINISTRATIVE SERVICE UNDER OPERATING EXPENSES RATHER THAN GRANTS.

The department received approval for an FTE to replace the professional contract noted in the report. The one person under contract helping prepare the "spotlights" is a legitimate contract. They have not given any new contracts for monitoring, but department officials assured us that any future ones will be recorded as operating expenses not grants.

FY 1982-83 BIENNIUM

During the FY 1982-83 biennium, the Department of Natural Resources and Conservation has effected several changes in the Renewable Energy Program, based on recommendations from the legislature, the legislative auditor and a DNRC review. Perhaps the most significant development is the loan program for commercializing renewable energy. This program directly stimulates Montana's renewable energy industry, involves the private financial community in proven renewable energy technology, and allows public funds to be repaid when used in commercial applications.

In July 1981, DNRC temporarily suspended the grant cycle to allow for an in-house review of the program changes, including the new loan program. The review included a look at past grants, an assessment of the current renewable energy situation in Montana, and a determination of funding priorities for grants and loans. Several administrative changes resulted from the DNRC review, including the following:

* Within DNRC's Energy Division, the Renewable Energy Bureau and Conservation Bureau were combined. This reduced duplication of effort between complementary state and federal programs and allowed for better project coordination and sharing of staff resources.

* DNRC revamped the program's administrative rules to accomodate the new loan program and to further define eligible grant projects. Among the rule changes is a stricter definition of what qualifies for grant funding for demonstration, with a greater emphasis on public and private nonprofit projects. Also, legislative changes from last session restrict demonstration projects to locations where no similar projects have been built. Demonstration projects must incorporate a relatively well proven renewable energy technology with a strong likelihood of significant energy savings. Technologies in the research and development stage will not be funded as demonstrations. A maximum funding level was established for any single grant or loan or for any single applicant or project: 10 percent of the total program appropriation ($180,000 in FY 1982).

* The grant contracting procedures were changed to give DNRC more control over project direction and progress. One significant change is in method of payment -- grantees are

now paid only as they reach negotiated "milestones" in completing their projects. These procedures, coupled with closer monitoring of projects and stricter enforcement of grant provisions, should ensure timely completion of projects. Also under these procedures, DNRC retains ownership of all project materials and equipment until the terms of the contract are fulfilled. At that time, all equipment not essential to continued system operation is returned to the Department.

* The Department has developed stronger criteria for selection of grant projects. These criteria will include increased emphasis on public benefit, grantee qualifications, and matching funds provided by the applicant.

* DNRC has improved coordination with related state agencies and councils, most notably the Environmental Quality Council, which oversees the program.

* More emphasis is placed on solicited projects. Although the unsolicited grant cycle is still a major part of the program, DNRC has taken a more active role in determining renewable energy needs across the state, and is no longer relying solely on unsolicited grants to meet these needs.

* DNRC has discontinued funding unsolicited projects outside the normal grant cycle.

* DNRC is conducting a sustainable energy assessment to develop the information required for the near-term implementation of cost-effective conservation and renewable energy measures. The project is three-fold: an end-use analysis will target the most promising opportunities for conservation and renewable energy application; a resource assessment will quantify the extent and availability of the renewable resources for energy production; and a technology profile will permit the most cost-effective and reliable match of commercially available systems with the available resource and with the energy service demanded. The results of this assessment will help DNRC better direct and set priorities for the Renewable Energy Program.

* DNRC has increased its public information efforts for renewable energy. Program information is intended to increase awareness of what the projects have accomplished and to advertise the availability of grants and loans. This has resulted in greater competition for grant funds than in past years. The other facet of information delivery is to provide people with substantive energy information on what works and doesn't work in Montana.

These efforts include press releases, feature stories, radio and television public service announcement, films, workshops, fairs, speeches and demonstrations. Documents published throught the program include:

- The Montana Renewable Energy Handbook -- an introduction to solar, wind, small-scale hydropower, geothermal and biomass energy alternatives;

- The Montana Sunpower Series -- case studies of residential active and passive solar energy systems in Montana, including those funded through the program;

- Guidelines -- application forms for renewable energy grants and loans;

- Montana Hydropower -- a guide to permitting requirements for small-scale hydropower projects; and

- Spotlights -- one-page descriptions of various renewable energy projects across Montana.

These publications are coordinated with several others published through DNRC's Energy Division.

Another ongoing information project under the Renewable Energy Program is the final report library. This collection of final reports from grant projects is available to the public. DNRC reviews each final report for clarity and accuracy. A paragraph describing the project and the technical level of the report is then added to the library inventory. DNRC is developing a brochure describing the library and listing reports available for Montanans to borrow. A report that is continually in high demand will be published for more general distribution.

MONTANA SUSTAINABLE ENERGY ASSESSMENT (SEA)

INTRODUCTION

During the last decade, the state role in energy evolved partly in response to disruptions that occurred from imbalances in supply and demand. Generally, state response to energy development has been reactive in nature with limited state initiative in energy planning. However, the very events that require state response have also emphasized the need to strengthen states' ability to react more effectively to avoid or minimize the impacts of energy development.

The experience of the last decade suggests that current energy problems ultimately can be solved only by a well planned transition to a sustainable energy future. Sustainable energy refers to energy conservation and the utilization of renewable energy resources. A sustainable energy infrastructure would be the outcome of the dispersed application of site-specific renewable energy and conservation technologies. This infrastructure will probably develop incrementally with the addition of renewable energy and conservation energy supply systems to the existing infrastructure. The increment of sustainable energy supply that can be acquired in the near term depends upon identifying those targets of opportunity across the range of energy demands for which renewable energy and or conservation applications are more economical and at least as reliable as conventional supply sources.

In order to provide various energy services cost-effectively and reliably, energy suppliers must know the nature and extent of the energy services demanded. This requires a change in the traditional energy planning perspective in which the importance of marketing particular energy forms or fuels overrides the analysis of the energy services demanded. An analysis of the particular end-use for which energy is required is a prerequisite for the determination of the most cost-effective and reliable energy source and technology to provide the necessary energy service. This, and not a predetermined preference for a particular energy form and a particular energy supply technology, should be the basis for a choice of energy source and technology.

Data requirements for planning a sustainable energy system are more extensive than in a conventional system. Historically, energy suppliers have developed economic and engineering information essential for facility design, as well as information about future population growth, industrial development, price elasticity and other variables which affect future demand for electricity. Generally, the analysis requires limited information about energy end-use by sector. In comparison, planning for the implementation of conservation and renewable energy measures not only requires information on economic, engineering and econometric factors, but also detailed information about energy end-use in the different sectors of consumption. An analysis of

conservation opportunities cannot proceed without information about such factors as the thermal integrity of building shells, process efficiencies, and climate. Similarly, an analysis of renewable energy opportunities cannot proceed without information about the thermodynamic quality of energy required to perform current and future energy end-use tasks. The acquisition of cost-effective sustainable energy resources will require a fairly extensive energy end-use data base for all sectors of electrical energy consumption (i.,e., residential, commercial, small industrial, large industrial, and agricultural). Such energy end-use enables an accurate assessment of conservation and renewable energy opportunities in the service area. For planning purposes, this assessment is useful only if it specifies the opportunities available at specific times, specific costs, and specific locations. Determination of the conservation and renewable energy potential is a prerequisite for planning to acquire a cost-effective and reliable energy supply.

The appropriate match between energy end-use, energy source and technology depends upon the availability of extensive information about energy use patterns, availability and extent of energy resources and characteristics of existing energy technologies. Although a limited amount of this information is currently available, it is not sufficient to insure that all feasible energy supply options have been rigorously evaluated before energy sources are acquired. In spite of a growing recognition of the need for a comprehensive data base to implement energy end-use matching as the dominant energy planning paradigm, data gathering efforts have been limited and fragmented. The State of Montana, therefore, proposes that a comprehensive data base be built through energy end-use analysis, energy resource assessment and technology characterizations.

The purpose of the Montana Sustainable Energy Assessment (SEA) is to develop the information required for the near-term implementation of cost-effective sustainable energy measures. The assessment must be useful to those in public and private sector agencies who will be responsible for - or at least substantially influence - the implementation of these measures. The current dearth of useful information about energy end-use, and the renewable resource and technology availability makes it virtually impossible to evaluate the full range of energy options to meet existing and future demand for energy services. Three major analytical elements constitute the SEA: End-Use Assessment; Resource Assessment and Technology Profiles.

The SEA is a year long study with a budget of approximately $300,000 of state funds. The output of the project will be an end-use analysis which targets the most promising opportunities for conservation and renewable energy application; a resource assessment quantifying the extent and availability of the renewable resources for energy production, and technology profiles to permit the most cost-effective and reliable match of commercially available systems with the available resource and with the energy service demanded. If additional funding becomes available from other sources then the task statements can be expanded accordingly.

PROJECT ELEMENTS

End-Use Assessment

Statewide end-use assessment to develop detailed site specific data could cost from several hundred thousand to a few million dollars. A more limited end-use analysis must at least provide an adequate basis for a valid estimate of conservation and renewable energy potential. Such an estimate will provide a basis for targetting further end-use analysis, if necessary, to develop implementation programs for specific conservation and renewable energy measures. Moreover, given current budgetary constraints, even this type of limited end-use analysis can not now be accomplished for all energy consuming sectors. Therefore, the end-use analysis should be conducted for those sectors where the potential for cost-effective conservation and renewable energy opportunities is high or where there is a danger of disruption of an existing energy supply source, a disruption which could result in serious economic consequences.

The residential and commercial sectors are energy consuming sectors where potential for cost-effective conservation and renewable energy measures appears to be high. Moreover, unlike the industrial sector, residential and commercial energy consumers do not generally have the technical and financial resources to audit their energy use or to institute actions effective at the margin to achieve increased energy efficiency. An energy end-use analysis of the residential and commercial sector will provide sufficient information to target specific opportunities for further study and implementation.

The residential sector analysis will provide demographic information (e.g., household size, income, employment), thermal integrity data (e.g., level of insulation, glazing) and energy consumption characteristics (e.g., type of heating, appliances). A mail survey will be employed to obtain this data and the results can be compared to existing residential energy end-use data.

Because the diversity of businesses precludes data collection at the level of that proposed for the residential sector, the commercial end-use analysis will survey the types of businesses by SIC codes to determine whether regional or national data on commercial energy consumption is relevant and then target further end-use analysis to the types of commercial enterprises where conservation and renewable energy potential appears high.

The other sector for which end-use data should be collected and for which minimal data is currently available is off-road transportation, particularly fuel use by agriculture. Montana's economy is especially susceptible to any disruption in the supply of diesel fuel. Consequently, information about off-road fuel use - including that use by the wood products industry - is necessary to determine the potential of transportation conservation measures and fuel substitution possibilities (e.g., biomass fuels).

The approximate cost for conducting the residential analysis is $30,000, $40,000 for the commercial and $30,000 for transportation sector analysis.

Resource Assessment

Considerable information has been gathered for both the solar and geothermal resource. The state funded solar insolation data program can be improved by the collection of degree day data at each solar monitoring location for which degree day data is currently not collected. A summary report of the geothermal resource team's assessment should be commissioned, but other than this report there is no additional geothermal assessment now required. Resource assessment for wind, hydro and biomass lags considerably behind that of solar and geothermal. As is the case for end-use analysis, budgetary and time constraints mitigate against an exhaustive survey of these resources. Resource assessment of wind, hydro and biomass must also be focused on "targets of opportunity." The target of opportunity for a wind study is wind farms for utility or community applications; for the hydro study the target is retrofit of existing structures and high head, micro and small-scale hydro application, and for biomass, central station electric plants and liquid fuel production through cultivation of energy crops.

The wind resource assessment will assess the available wind resource information in Montana to determine if enough information exists to locate potential wind farms. There may be sufficient information to prospect for sites on a county by county basis; if not, initial prospecting could be started within budget and time constraints. The prospecting, however, could require additional budget and time. Location of the sites will then require extensive wind monitoring and study of site characteristics such as accessibility, transmission corridor(s), and ownership patterns.

The hydro assessment for high head, micro and small-scale installations may best be accomplished by field surveys of one drainage (tributaries and mainstream) to develop a basis (e.g., modeling) for estimating available power of other drainages. Hydro assessment for existing structures is simply a matter of identifying existing structures and determining their hydro power potential.

The biomass assessment will study crop and forest residue availability and the potential of crops grown solely as an energy source. Residue assessment can be accomplished through a compilation of existing information. The potential of energy crops will require development of new information to determine which crops can be grown in Montana and the conditions necessary to cultivate sufficient volumes of these crops.

The cost of the wind assessment is estimated to be $40,000; for hydro, $40,000; for the biomass, $50,000; and perhaps $5,000 to accomplish remaining work on solar and geothermal.

Technology Profiles

The technology profiles will develop information about commercially available sustainable energy technologies in order to define the technical and economic parameters upon which an analysis of specific renewable and conservation measures can be based. The technology profiles will also identify those technologies which are not yet readily available but which can be expected to be commercialized shortly. A technology profile differs from a technology assessment. The goal of the profile is to gather only sufficient information for its evaluation in the context of the SEA project rather than a detailed engineering document. A technology profile will include an analysis of the performance characteristics, costs and special requirements and impacts of each technology. The technologies can then be assembled into a matrix or catalogue listing in order of cost-effectiveness those technologies that are appropriate to a particular end-use given, in the case of renewable energy technologies, the availability of an energy source.

The cost of the technology profile element is estimated to be $35,000.

MANAGEMENT OF THE SUSTAINABLE ENERGY ASSESSMENT

The Energy Division of the Department of Natural Resources and Conservation will manage SEA. Task statements will be incorporated in Requests for Proposals. In some instances, Division staff will draft the RFPs and in other instances contractors will be retained to do so. All responses will be evaluated according to a set of criteria specific to each RFP.

Contracts will be awarded on the basis of point ranking by a team of evaluators. Contracts will be issued for a specific product of work according to Department contracting procedures. The contracts will be worded to insure the Department's exercise of quality control. The Department will assign a Division staff member to serve as program manager. Other Division staff will provide technical support to the program manager as the need arises. Division staff will conduct technical reviews of the ongoing contractual work and evaluate the final product.

The Energy Division has had extensive experience developing RFPs, evaluating proposals and monitoring contracts. Division staff have developed expertise in technology profiles, (especially solar, hydro and biomass), resource assessment (especially solar and geothermal) and end-use analysis (especially residential, industrial and irrigation). Division staff have designed survey instruments for end-use analysis and methods of analysis of end-use data.

The Sustainable Energy Assessment is the distillation of several years of experience with sustainable energy options in both a program and a policy

setting. Since 1976, the Department of Natural Resources and Conservation has managed the Alternative Renewable Energy Sources Program which has funded 264 projects for a total of $5,239,174. The projects include research, development and demonstration of the full range of renewable energy system and several educational, informational, and technical assistance projects. Since 1977, DNRC staff have administered statewide conservation programs. Currently, the Department administers the State Energy Conservation Program, and Energy Extension Service Program, the Institutional Buildings Grant Program, the Residential Conservation Service Program and Emergency Energy Conservation Program. By law, the Department executes the regulatory requirements of the Major Facility Siting Act which applies to all energy conversion facilities greater than 50 MW. The Department prepares a demand forecast for and an analysis of alternatives (including conservation and renewable energy alternatives) to the proposed facility. The Department has also been lead agency for projects which fall under the purview of the Montana Environmental Policy Act. During past legislative sessions, the Department has drafted key pieces of legislation affecting the use and acquisition of sustainable energy options.

Benefits of the Sustainable Energy Assessment Project

The data gathered for the Montana Sustainable Energy Assessment will be used in planning the Department's renewable energy and conservation programs. The data will show which areas have the greatest potential for energy savings and thereby form the basis for evaluating the impact of various program activities. Because SEA will identify cost-effective and reliable sustainable energy technologies for particular end-use applications, state conservation and renewable program manpower and financial resources can be targetted to obtain the most effective mix of program measures. Funding can be allocated to attain the maximum impact for each dollar spent. SEA will enable energy companies, especially utilities, to extract applicable information and assess the potential of sustainable energy options in thier service area. This information will permit utility planners to evaluate all energy supply options - conservation, renewable and conventional - on a comparable basis and to choose those which can best meet their customers' need for energy.

Although the information that SEA will generate will be specific to Montana, and of obvious use to decisionmakers at the state and local level, the information will also be valuable to federal power marketing agencies operating in Montana - the Bonneville Power Administration, and the Western Area Power Administration - as well as to a number of energy companies doing business in Montana. Moreover, the data gathering techniques and methods of analysis can be readily transferred to other states in the region which intend to build a comparable asssesment of sustainable energy options.

November 1982

MONTANA SUSTAINABLE ENERGY ASSESSMENT PROJECT

The Energy Division, Department of Natural Resources and Conservation (DNRC), is conducting a series of studies, known collectively as the Sustainable Energy Assessment (SEA) Project, to assess the potential of, and develop a data collection on, energy conservation and renewable energy in Montana. SEA is intended to support 1) the formulation of government sustainable energy policy, and 2) private sector development of sustainable energy resources. It will concentrate on questions of general feasibility and estimates of potential that are of immediate and middle-term interest. The results of SEA will be integrated into the Renewable Energy Grant and Loan (REGAL) program, state energy conservation activities, and the needs and alternatives analysis required by the Major Facility Siting Act whenever an application is submitted. SEA is conducted by the Planning and Analysis Bureau. Implementation and hardware development programs for sustainable energy are carried out by the Conservation and Renewable Energy Bureau.

SEA consists of a series of studies in the areas of resource assessment, energy end-use analysis, and technology profiles. Resource assessment projects will estimate the amount of renewable resources available in specific regions. End-use analyses will describe the current purposes for which energy is used. Analysis of end-use will define the need and opportunity for the various sustainable energy technologies. Technology profiles will be generic descriptions of different sustainable energy technologies in terms of economics, environmental impact, institutional barriers, and other social concerns.

The projects currently contained in SEA are described below, by study area. These studies were selected on the basis of DNRC's experience with the REGAL program and with the Kootenai River Hydroelectric Project Environmental Impact Statement, and were selected with the intent of minimizing duplication of other sustainable energy assessment projects being conducted in the state and region. The primary source of funds is DNRC's REGAL program, which is funded out of the state's coal severance tax. Other agencies and organizations are providing some funds or matching resources. Projects will be expanded and/or added to if more funds become available. Budgets and schedules for individual studies are based on the in-house research from which the Requests for Proposals (RFP's) are developed. Projects deemed infeasible following in-house research for the RFP will be dropped.

RESOURCE ASSESSMENT

Liquid Biofuels

Crops and conversion procedures suitable for producing diesel fuel substitutes and extenders, especially vegetable oils, will receive primary attention. This emphasis is based on the assumption that diesel fuel is more critical to the healthy functioning of Montana's economy than is gasoline. The possibility of alcohol production from agriculture and food processing wastes also will be studied. Three studies, on Montana's vegetable oil resource, on future research needs on diesel fuel substitutes, and on alcohol from agriculture and food processing waste, will be completed in December, 1982.

Future Residential Wood Fuel Use

Future residential wood fuel use will be estimated using econometric methods. Data on wood availability will be taken from existing literature. Future changes in the cost of wood, of gathering wood, and of stoves and other equipment will be key considerations. Results of this study will be used to estimate future displacement of conventional fuels by wood and to estimate future pollution problems.

High-head Hydro Resource Assessment

DNRC and the United States Geological Survey (USGS) will conduct a year long study of 40 streams in northwest Montana on which high-head hydroelectric generating facilities might be located. The monthly measurements gathered in this study will be correlated with measurements at gauging stations for which historical data is available, and flow duration curves will be synthesized. Efforts will be made to extrapolate these results to other streams in the region that have not been measured. This study will identify potential sites not previously known, and will permit an independent evaluation of the potential of sites already filed on. The report will be issued in Fall, 1983.

Flow Duration Curve Estimation Procedures

Montana State University will develop a method of obtaining estimates of flow duration curves from topographical maps and existing data. The method is expected to be useful in the mountainous regions of the state, and possibly on the plains. This method will later be refined by, or incorporated into, the USGS model. Its availability in December 1982 will enable it to be used in the permitting process for the recent wave of filings for micro- and small-scale hydro facilities.

Irrigation Canal Generating Facilities

The construction of generating facilities can be economically attractive on some irrigation canals. A prefeasibility survey of state owned water projects will be conducted. Other irrigation districts and/or private ditch companies will be added if additional funds can be obtained. Because of the minimal regulatory requirements, and the existing documentation of the nature of the flow, the development of feasible sites on these canals could proceed more rapidly than other types of hydropower development.

Wind Energy Resource Atlas

Wind data has been collected by a number of agencies and companies for a variety of purposes. An appropriate compilation of this data could expedite prospecting for wind farm sites. The different sources of wind data will be cataloged, the quality of the data evaluated, and the summaries of the data provided. This atlas will supplement rather than supplant existing data bases. The atlas will be published in early 1983. DNRC will follow the atlas with a wind prospecting program.

END USE ANALYSIS

Residential Sector

Samples of residences across Montana will be surveyed to determine thermal characteristics of existing residences as well as appliance use patterns. The results of these surveys will be analyzed to determine the conservation potential in the residential sector. DNRC will use analytical tools ("protypical buildings") similar to those being used by BPA, the Northwest Power Planning Council, and other organizations in the region. Much of the survey data has or will be collected as part of the permitting process mandated by Montana's Major Facility Siting Act. DNRC will work closely with utilities and cooperatives to gather data in the remaining areas of the state. The analysis will be supplemented by data from the census and other secondary sources.

Commercial Sector

Survey and analysis of the commercial sector will follow a process analogous to that for the residential sector. This study, however, will be much larger, since the commercial sector is more diverse, and the tools for analyzing it are less developed than for the residential sector. Special efforts will be made to develop a reliable survey instrument that can be administered at relatively low cost by mail, with telephone and

walk through follow-up. The Montana Power Company service area will be used as the initial case study. This study will supplement the alternatives analysis required by the Major Facility Siting Act.

Transportation Sector - Diesel Use

The patterns of use of diesel fuel in Montana will be estimated by end-use. The emphasis will be on off-road use, as in railroads, agriculture, and logging. Petroleum industry data and secondary sources, such as maintained by the Departments of Highways and Agriculture, will be examined.

TECHNOLOGY PROFILES

Superinsulation and Passive Design and Retrofit

In light of the Saskatchewan experience, DNRC believes that superinsulation could be an economically viable alternative for residences and small commercial buildings. In particular, superinsulation retrofit, if feasible, would significantly increase the conservation potential of existing buildings. Passive designs also could be useful in Montana's climate. Certain issues, such as maintaining indoor air quality, require special investigation. The study will be based on a review of the literature, with cost estimates obtained from Montana builders and architects. Institutional considerations also will be studied.

Small-scale, Innovative Cogeneration

Cogeneration units could provide electricity as well as heat for shopping centers, hospitals, and other commercial and institutional buildings. A literature review, in conjunction with the results of the commercial sector survey, will identify the potential in Montana.

Solar Domestic Hot Water Systems

Performance and economics of a typical solar domestic hot water (SDHW) system will be estimated for various locations in Montana, using a DNRC computer model and based on DNRC's insolation monitoring program. The results of this study will be compared with DNRC's SDHW system performance monitoring project. The technical report will be available in December, 1982, and a consumer guide will be released in Spring, 1983.

Heat Pumps

The literature will be reviewed to determine performance characteristics of commercially available air-to-air and water-to-air heat pumps. Models to estimate output will be identified and sample runs will be made.

Truck Conservation

Methods of improving the fuel efficiency of Montana's trucking industry will be examined. The literature will be surveyed to determine what equipment and maintenance procedures are most effective. The cost of these measures in Montana will be determined. Institutional barriers to efficiency will be identified. Means of encouraging adoption of efficiency measures will be discussed.

SEA Budget

Current Studies	Budgets (Non-DNRC funds)
Wind Energy Atlas	$18,000
Survey of Streamflows in Northwest Montana	$61,000 (USGS - $21,000)
Quick Method for Estimating Annual Flow in Small Streams	$11,400 (MSU, DFWP - $9,000)
Assessment of the Vegetable Oil Resource in Montana	$32,000
Future Research Needs for Diesel Fuel Substitutes and Extenders	$ 5,000
Alcohol from Agriculture and Food Processing Wastes	$11,000
Solar Domestic Hot Water Economics and Output	$ 3,000

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